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USER'S GUIDE

KV SERIES
AC/DC KILOVOLTMETERS
MODEL NOS.: KV25A, KV50A, KV100A,
KV200A

Hipotronics inc.

applied high voltage technology for industry utilities & science

MP MASTER
MA35004

HIPOTRONICS, INC. Hipotronics BREWSTER, NEW YORK 10509 (914) 279-8091 / TWX: 710-574-2420

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DANGER HIGH VOLTAGE

WARNING: This publication describes a product engineered and designed to supply HIGH VOLTAGE. Accordingly, maximum safeguards have been built into the equipment and the best safety techniques possible are set forth in the unit's operating instructions. These instructions contain cautions, warning the user to exercise great care in the use of certain controls and at appropriate points in the operating procedures. Despite these written warnings the operator of this equipment is nevertheless strongly advised to maintain a safety consciousness at all times. The following rules are particularly relevant and must be followed at all times.

BEFORE CONNECTING INPUT POWER, GROUND CASE.
BEFORE UNGROUNDING CASE, DISCONNECT POWER.

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SCOPE

This publication describes the HIPOTRONICS KV Series of Kilovoltmeters. It is intended to provide a simplified reference for users of this equipment, and to allow them to make use of its features quickly, safely, and efficiently.

Information in the body of this publication applies to all four models in the KV Series. Information pertinent to the specific model purchased is provided in the pocket of the back cover of the publication. This includes a diagram of the control panel, a PCB assembly diagram, an electrical schematic and a parts list.

This publication contains three major sections: General Description, Installation and Operation Instructions and Special Operations.

The General Description section describes the major features of the models in the KV Series, and also contains a description of the functions performed by each of the controls and indicators on the control panel.

The Installation and Operation Instructions section provides step-by-step instructions for installation or setup of the unit.

The Special Operations section describes the procedures involved in Voltmeter Recalibration and trouble-shooting.

REFERENCES

It is assumed that the user has a basic understanding of the handling of electrical equipment and the major function to be performed by the equimpent to be used. An outline of the functions, features and specifications of the HIPOTRONCIS KV Series Kilovoltmeters is provided in HIPOTRONICS Brochure HP7104. Valuable information is also contained in the American Society for Testing Materials (ASTM) standards under the D2865 category and the American National Standards Institute (ANSI) specifications C68.1.

GENERAL DESCRIPTION

This section is intended to acquaint the user with the major features of the models in the HIPOTRONICS KV Series, and the functions performed by each of the controls and indicators on the control panel.

FEATURES AND SPECIFICATIONS

The HIPOTRONICS KV Series consists of four units (KV25A, KV50A, KV100A, KV200A) designed to measure either ac or dc voltage in kilovolts. Engineered for safety and precision, these lightweight units are rugged and easy to use.

Every unit has one hand portability plus safe storage for AC/DC dividers behind the front panel. Each model has a convenient triple range voltmeter with a guaranteed 1.0% accuracy.

Every KV model is designed for maximum equipment and operator protection. The protective network built into the equipment protects the component and the operator from a short circuit at full output.

SPECIFICATIONS	MODEL KV25A	MODEL KV50A	MODEL KV100A	MODEL KV200A
Meter Ranges (kV)	0-5/10/25	0-10/25/50	0-20/50/100	0-40/100/200
Volts Division	50/100/250	100/250/500	200/500/1000	400/1000/2000
Impedance	90 M ohms at 200 pF	190 M ohms at 200 pF	380 M ohms at 100 pF	760 M ohms at 50 pF
Size	8 1/2" W x 10 1/2" D x 15 1/2" H	8 1/2" W x 10 1/2" D x 15 1/2" H	8 1/2" W x 10 1/2" D x 15 1/2" H	9 1/2" W x 10 1/2" D x 40" H
Weight	18 lbs	20 lbs	21 lbs	40 lbs

All models operate at the maximum input voltage indicated by their respective model numbers. Features include:

- an average responding meter calibrated in rms
- a triple-range meter
- separate dividers for ac and dc enclosed in one oil filled tube
- an input function switch with a shorting position
- an extremely low temperature-coefficient (0.025% per °C)
- provision for ripple measurement on the ac range

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CONTROLS AND INDICATORS

The function and uses of the various controls and indicators are described below.

KILOVOLTMETER .

The KILOVOLTMETER is the upper window on the panel and indicates the ac or dc input voltage. The numbers above the meter markings measure the kilovolt input in the HIGH range. The MEDIUM and LOW ranges are indicated by the numbers below the meter markings.

METER RANGE

The METER RANGE is selected by the knob on the lower left side of the panel. The appropriate range selection depends on the amount of expected input voltage. Each model in the KV Series has a specific meter range capability from the low range (0-5 kV) on the KV25A model to the high range (0-200 kV) of the KV200A model.

FUNCTION SWITCH

The FUNCTION switch is controlled by the knob on the lower right side of the control panel. The function selection is determined by the type of input voltage. The FUNCTION switch also has a shorting position which protects the meter when the unit is in transit.

PICKUP

The PICKUP jack is in the center of the lower part of the control panel. The grey interconnecting lead must be connected to the PICKUP jack on the divider and on the panel to establish current flow.

GROUND

The GROUND terminals on the divider and the meter panel must be properly grounded to protect the operator from possible shock.

INSTALLATION AND OPERATION INSTRUCTIONS

This section provides step-by-step instructions for the operation and installation of the KV Series Kilovoltmeters.

1A. For all models except the KV200A and the KV300A: Unfasten the latching screw at the top of the control panel. Gently lower the panel and remove the divider. Reposition the control panel, placing the meter in the position the unit is used. Fasten securely in place.

B. For the KV200A and KV300A models, ensure the unit is standing upright on a flat surface with the meter facing up. The end with exposed nutheads is the bottom end. The end without is the top end and contains the meter. Unlatch bottom cover and gently remove sleeve from divider. The meter is contained in the sleeve. Unlatch the top cover to expose meter.

2. Interconnect the ground on the power source to the ground post on the voltage divider. Ensure that the control panel is properly grounded. Ground posts are identified on all control panels.

3. Place the voltage divider near the HV source and connect the HV power supply to the top of the divider.

4. Set the FUNCTION switch to the required mode. Set the METER RANGE to the selected position.

5. Turn the high voltage supply and check the reading on the unit meter.

6. To measure ripple voltage on a dc source, switch from the FUNCTION selector to the ac mode. The unit is now average responding not measuring rms.

SPECIAL OPERATIONS

This section describes step-by-step procedures required to perform Voltmeter Calibration.

VOLTMETER CALIBRATION

Voltmeters on HIPOTRONICS KV Series units have been calbrated with standards traceable to national standards maintained by the National Bureau of Standards in Washington, D.C., and are certified accurate to within 1% when shipped.

Voltmeter recalibration should be performed by the user as often as necessary to meet the requirements of each particular installation, as dictated by usage and by the user's standards for accuracy. Considering these requirements, frequency of meter recalibration depends primarily on three factors: amount of physical handling, time lapse and the extent of meter usage. Intervals between meter recalibration may vary anywhere from one month to one year.

The process of voltmeter recalibration consists of two sections to be performed in the sequence described below:

VOLTMETER RECALIBRATION - DC

1. Calibrate the instrument in the position in which it is going to be used.
2. Ensure that the unit and the divider are properly grounded.
3. Connect the standard meter and the KV divider to the high voltage dc or ac power source. Use the proper conductor sizes for corona free operation (approximately 0.1" per kV).
4. Attach the interconnecting lead from the PICKUP jack on the divider to the PICKUP jack on the control panel of the main unit.
5. Set the METER RANGE on LOW and make sure that the FUNCTION INDICATOR is set on dc.
6. Turn the power ON and check the reading on the unit meter.
7. Adjust the unit meter as necessary via the calibration pot labeled DC on the back of the printed circuit board until the meter reading equals the reading on the external meter.
8. Switch the METER RANGE control from LOW to HIGH, and check the unit to ensure that the high scale reading is accurate.

NOTE! CAL OF METER UNIT ONLY ON 40
RANGE DC IS .668 V/PER 1KV
AC IS 1.85 V/PER 1KV

RANGE SWITCH WILL NOT OP. UNLESS ACTUAL VOLTAGE IS APPLIED TO DIVIDER

VOLTMETER RECALIBRATION - AC

1. Calibrate the instrument in the position in which it is going to be used.

2. Ensure that the unit and the divider are properly grounded.

3. Connect the standard meter and the KV divider to the high voltage ac power source.

4. Attach the interconnecting lead from the PICKUP jack on the divider to the PICKUP jack on the control panel of the main unit.

5. Set the METER RANGE on LOW and make sure that the FUNCTION INDICATOR is set on ac.

6. Turn the power ON and check the reading on the unit meter.

7. Adjust the unit meter as necessary via the calibration pot labeled AC on the back of the printed circuit board until the meter reading equals the reading on the external meter.

8. Switch the METER RANGE control from LOW to HIGH, and check the unit to ensure that the high scale reading is accurate.

TROUBLE-SHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	RECOMMENDED ACTION
NO METER READING	A. Interconnecting cable shorted at jack end.	A. Disconnect and check against standard ohmmeter for shorting.
NO AC CALIBRATION	A. Defective C2 capacitor on the bottom divider. B. Defective CR1-4 capacitor.	A. Repalce C2 .033 µF. B. Replace CR1-4 IN4820.
SHOCKS FROM FRONT PANEL CONTROLS	A. Ungrounded unit.	A. Ground front panel and divider.
NO METER TRACKING WITH APPLIED VOLTAGE	A. Meter holding static charge.	A. Place controls further away from the high voltage - Use static solution on Meter 1.

RETURNED MATERIAL

If, for any reason, it should become necessary to return the equipment described in this publication to the factory, the Warranty Service Department of HIPOTRONICS must be contacted, at which time the following data must be given in order that we may identify the unit and determine the necessity for return. (Tel. (914) 279-8035) MODEL, SERIAL NO. and TYPE (Part No) is indicated on the black and silver tag affixed to the unit.

MODEL:
SERIAL NUMBER:
TYPE (Part No):
REASON FOR RETURN:
DEFECT:
ALLEGED CAUSE OF DEFECT:

If HIPOTRONICS deems return of the unit appropriate, an "Authorization for Return" tag will be issued. This will instruct you as to the method of return. The pink copy is for your records, the hard copy to be affixed to the unit being returned. If return is not deemed advisable, other inspection arrangements will be made.

NOTE: Material received at this point without the proper authorization shall be held as "customer's property," with no service performed until such time as the proper steps have been taken.

Your cooperation is requested in order to ensure prompt service. Thank you.

PARTS ORDERING

To order replacement parts of this unit, please refer to the Parts List contained in the pocket of this publication. The number of the specific component is required, along with the TYPE (Part No) of the unit. The TYPE (Part No) is indicated on your Parts List, and on the black and silver tag affixed to the unit.

Exhibit A
SOP#652

WARRANTY

HIPOTRONICS, INC. warrants to the orginal purchaser of any new merchandise that the merchandise is free from defects in material and workmanship under normal use and service for a period of one year from the date of shipment. The obligation of HIPOTRONICS, INC. under this Warranty is limited, in its exclusive option, to repair, replace or issue credit for parts or materials which prove to be defective, and is subject to Purchaser's compliance with the HIPOTRONICS, INC. Warranty Claim Procedure as set forth below. The happening of any one or more of the following events will serve to void this Warranty and any defect or damage resulting therefrom is specifically excluded for Warranty coverage: (a) defects due to accident, negligence, alteration, modification, faulty installation by Purchaser or Purchaser's agents or employee, abuse or misuse; (b) attempted or actual dismantling, disassembling, service or repair by any person, firm or corporation not specifically authorized in writing by HIPOTRONICS, INC. (c) defects caused by or due to handling by carrier, or incurred during shipment, transshipment or other move.

This Warranty covers only those parts and/or materials deemed by HIPOTRONICS, INC. to be defective within the meaning of this Warranty. The liability of HIPOTRONICS, INC. shall be limited to the repair, replacement or issuance of credit for parts deemed defective within the meaning of this Warranty. Costs incurred by purchaser for labor or other expenses incidental to the inspection, repair, replacement or issuance of credit for such parts and/or material shall be the sole responsibility of purchaser. This Warranty shall not apply to any accessories, parts, or materials not manufactured or supplied by HIPOTRONICS, INC. and if, in the sole discretion of HIPOTRONICS, INC., Purchaser's claim relates to any materials or workmanship manufactured or performed by the supplier of a component part, or of the manufacturer of a device of which the defective part is a component, HIPOTRONICS, INC. reserves the right to disclaim liability under this Warranty and to direct that the Purchaser deal directly with such supplier or manufacturer. HIPOTRONICS, INC. agrees to assist the Purchaser in processing or settling any such claim without prejudicing its position as to liability.

WARRANTY CLAIM PROCEDURE

Compliance with the following Warranty claim Procedure is a condition precedent to the obligation of HIPOTRONICS, INC. under this Warranty:

a) Purchaser must notify HIPOTRONICS, INC. in writing by certified or registered mail, of the defect claimed within twelve months after date of original shipment. Said notice shall describe in detail the defect, the defective part, and the alleged cause of defect.

b) At the exclusive option of HIPOTRONICS, INC., Purchaser shall dismantle or disassemble at Purchaser's cost and expense and shall ship the defective part or material prepaid to HIPOTRONICS, INC., Brewster, New York 10509, for inspection, or permit an authorized service representative of HIPOTRONICS, INC. to inspect the defective part or material at Purchaser's premises. If HIPOTRONICS, INC. shall inspect the part or material at the Purchaser's premises, Purchaser shall provide facilities for, and at Purchaser's cost and expense, dismantle, disassemble, or otherwise make accessible the subject part or material whether or not same is a component of or installed in a device other than that manufactured or supplied by HIPOTRONICS, INC. If disclosure shows that the defect is not one for which HIPOTRONICS, INC. is liable, the Purchaser agrees to reimburse HIPOTRONICS, INC. for all expense incurred.

c) Upon receipt of the defective part or material, or after access to same, HIPOTRONICS, INC. shall inspect the part or material to determine the validity of Purchaser's claim.

The validity of any Warranty Claim, Purchaser's compliance with HIPOTRONICS, INC. Warranty Claim Procedure, the obligation to either repair, replace, or issue credit, or direct the purchaser to deal directly with a manufacturer or supplier are to be determined solely and exclusively by HIPOTRONICS, INC. and any determination so made shall be final and binding.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED ON THE PART OF HIPOTRONICS, INC., INCLUDING THE WARRANTIES OF MECHANTABILITY AND FITNESS FOR USE, AND CONSEQUENTIAL DAMAGES ARISING FROM ANY BREACH THEREOF AND HIPOTRONICS, INC. NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON, FIRM OR CORPORATION TO ASSUME ANY LIABILITY OR OBLIGATION IN CONNECTION WITH THIS SALE ON ITS BEHALF AND PURCHASER ACKNOWLEDGES THAT NO REPRESENTATIONS EXCEPT THOSE MADE HEREIN HAVE BEEN MADE TO PURCHASER.

KVA 200A

DC .668 V / 1 KV

AC 1.8 V / KV

KVD 200 sub/801007
45-57

KV200A
CS 45-6
SN 867-00
TY 84/3
DENNIS NORBY

MP MASTER
MA35004

LOC: 113
MAN-06878